Molecular Plant-Microbe Interactions: New bridges between Past and Future

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2.7.2. Applications

PMY201

Influence of two species of VAM fungi on water uptake under drought tolerance in mycorrhizae symbiosis with barley

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A study was done to determine the effects of Vesicular-arbuscular mycorrhizal (VAM) colonization on drought acclimation of host plant. The barley (*Hordium sativa* L. cv. Scarlet) was grown under environmentally controlled conditions with and without the VAM fungus, *Glomus mosseae* and *G. intraradices* and were either acclimated (by pre-exposing plants to 10-11 day drought period) or unacclimated to drought. Drought effected the leaf RWC, osmotic potential, water potential and mycorrhiza colonization ratio. Interaction of colonization rate and tolerance to drought condition was visible between AM plants. We determined that at least 10% of colonization has positive effect to the leaf RWC and osmotic potential. In this study we found also, the *G. intraradices* is more suitable for mycorrhization then the *G. mosseae* in the barley. *G. intraradices* had less negative effect on the photosynthesis than the *G. mosseae*. The leaf total chlorophyll amount was 12% higher in plants which were in symbioses with *G. intraradices* than in plants which were in a symbioses with *G. mosseae*.

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Influence of arbuscular-mycorrhizal fungi on the perennial legume grasses at the high phosphorus level in soil

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In order to study the arbuscular mycorrhiza (AM) efficiency on the perennial legume grasses at the high phosphorus level in soil (106 mg available P/kg), two species of AM fungi, *Glomus intraradices* (G.st7) and *Gl. fasciculatum* (G.st8), as well as the symbiotic and associate bacterial strains from RIAM collection, were analyzed. The field investigations were carried out with *Trifolium repens* L. (cv. Belogorsky), *T. hybridum* L. (cv. Luzhanin) and *T. pratense* L. (cv. October) as well as with two cultivars of *Galega orientalis* Lam. (Gale, Nadezhda). As a result, the possibility of application of effective AM fungi strains for increasing the crop production was shown. The cv. Gale was highly responsive to inoculation with G.st7 and G.st8. In 2001, where *Rhizobium galegae* inoculum was applied in all treatments, G.st8 increased the crop yield by 22%, and in the next droughty year - by 60%, compared to the control without AM inoculation. G.st8 inoculum improved the plant growth as well as the fertilizer AVA (slowly solubilising nutrition complex without N), applied in high dose (720 kg/ga). In 2002, at the plot where *Rh. galegae* and *Arthrobacter mysorens* were applied together, G.st7 and G.st8 increased the crop capacity of first year plants by 65% and 82%. The coefficients of variation of individual plants for shoot weight are 59.5% and 67.0 %, when G.st7 and G.st8 inocula were applied, while in control it is 38.7%. These data show the possibility of symbiotic potential improvement of this cultivar by plant breeding.